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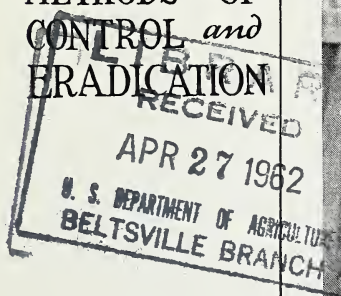


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# SHEEP *and* GOAT LICE

METHODS OF  
CONTROL *and*  
ERADICATION



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# SHEEP AND GOAT LICE AND METHODS OF CONTROL AND ERADICATION

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## Kinds of Lice and Their Habits

Sheep and goats, like many other species of animals, are commonly affected by two kinds of lice. The first and most important are the sucking lice, which obtain their food by puncturing the skin of the host animal and sucking blood. The second are the biting lice, which do not pierce the skin but feed on epidermal scales and other surface matter. A flock of sheep or goats may be infested with both kinds of lice at the same time, and all species of lice are injurious, especially if the host animals are grossly infested.

The two species of sucking lice commonly found on sheep in the United States are known technically as *Linognathus ovillus* and *L. pedalis* (fig. 1, A). The two sucking lice of goats also have been reported from sheep. The common biting louse of sheep, *Bovicola ovis* (fig. 1, B), is more or less prevalent throughout the country, especially in western range flocks. *Bovicola peregrina* has not been reported from American sheep. The two species of sucking lice of goats, *Linognathus stenopsis* and *L. africanus*, are widely distributed. Three species of biting lice affect goats, *Bovicola caprae* (fig. 2), *B. limbatus*, and *Holakartikos crassipes* (syn. *Trichodectes hermsi*).

The various stages in the life cycles of sheep and goat lice on their hosts have not been accurately determined but the following information is sufficient for their control and eradication. The sucking lice lay their eggs or nits in the fleece and attach them firmly on the wool or hair close to the skin, where the eggs hatch in from 10 to 18 days. The average period of incubation probably is about 12 days. Field observations indicate that the young female lice begin to lay eggs when they are 11 to 12 days old.

The biting lice deposit their eggs in the same general manner as the sucking species. The eggs of *Bovicola caprae* hatch on the goat during cold weather in 10 days, and observations made on experimental sheep and goats indicate that the period of incubation for other species of biting lice is about the same.

Often it is a decided advantage for the flock owner to be able to distinguish between sucking and biting lice, but usually it is not important from the practical standpoint that he differentiate between two or more species of biting lice or between different species of sucking lice. The sucking lice can easily be distinguished from the biting species. The former are larger than the latter and they have long, pointed heads which are longer than broad, whereas the biting lice have short, blunt, rounded heads which are broader than long. (Fig. 1.)

Both kinds of lice normally spend their entire life on animals and can live only a short time off their host. When off their host animals, sucking lice live about 3 or 4 days, and biting lice live 6 to 8 days. Ordinarily lice do not deposit eggs when separated from the host animals, but eggs attached to wool and hair may continue to hatch for two weeks or longer when detached from sheep and goats and kept in

<sup>1</sup> Retired. Slightly revised by H. E. Kemper and A. O. Foster, Zoological Division.

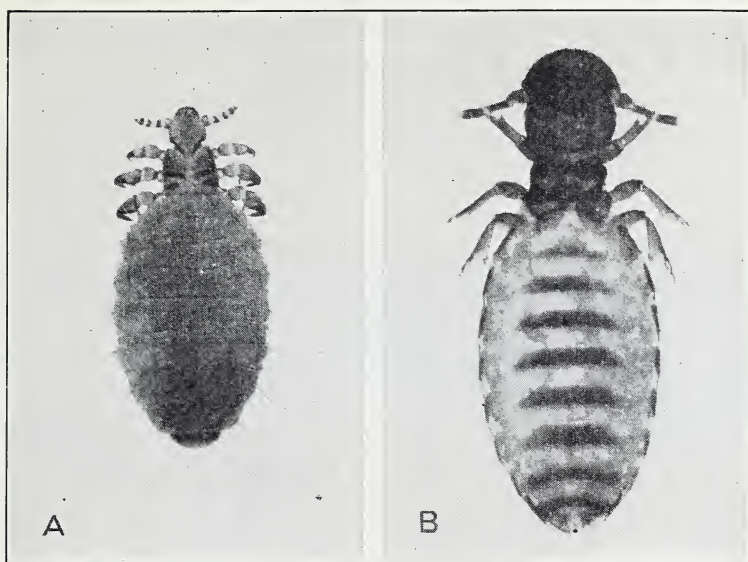


FIG. 1.—Sucking and biting lice: (A) Sheep sucking louse, female, *Linognathus pedalis*, about 32 times natural size; (B) sheep-biting louse, female, *Bovicola ovis*, about 32 times natural size.

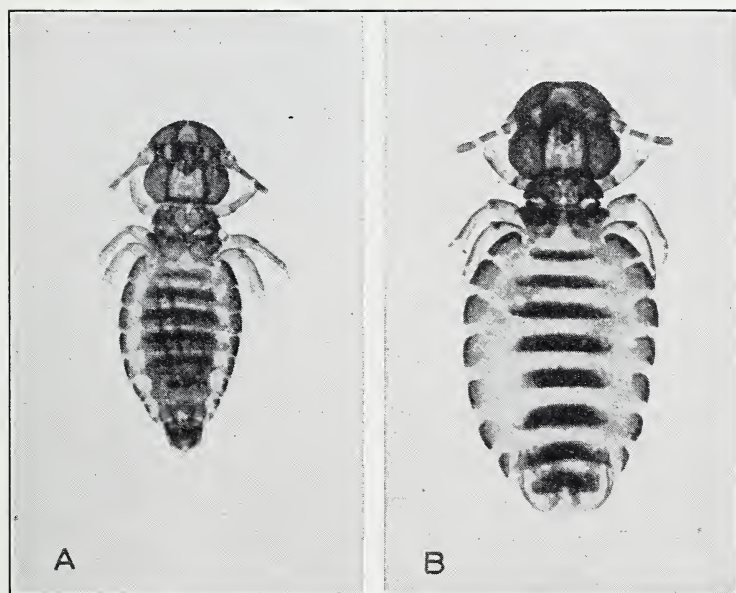


FIG. 2.—Biting louse of the goat, *Bovicola caprae*: (A) Male; (B) female; both about 40 times natural size. (Figures 1 and 2 are from photomicrographs by W. T. Huffman.)



a warm place. Young lice hatched in an incubator or in tufts of wool off the animal live only 3 or 4 days unless they find a host.

### Manner of Spreading

When introduced into a flock, lice spread rapidly, especially during cold weather or when the animals are confined in close contact with each other. Experimental data indicate that probably most of the cases of lice infestation occur from direct contact with lousy animals and not from infested premises. It is possible, however, for sheep and goats to become infested from permanent bed grounds or corrals and other inclosures which have recently been occupied by lousy flocks.

When infested sheep and goats are shorn, many of the lice and eggs are removed with the fleece, but a sufficient number usually remain on the animal to cause gross infestation the following winter. During the process of shearing and handling the fleeces some of the parasites become dislodged and tags of wool containing lice and eggs are scattered over the shearing floors. Community or public shearing sheds, therefore, usually become infested, and clean flocks shorn at such places are liable to show symptoms of infestation the following fall or winter. During cold weather, dislodged lice and eggs are not usually a source of danger since the lice become inactive and the eggs do not hatch. When the weather is warm, however, eggs attached to dislodged wool may continue to hatch at varying intervals extending over a period of about three weeks, and since the young lice may live off the host for 3 or 4 days, it is possible for premises which have been occupied by lousy flocks to remain infested for 25 days or even longer.

Except in accidental cases, sheep and goat lice live only on sheep and goats, and there is no danger of other species of animals becoming infested from contact with lousy flocks or from premises occupied by such flocks. Other species of animals may, however, act as temporary carriers of the lice, and dogs, burros, and other animals which are in more or less constant contact with lousy flocks, should be treated as possible carriers of lice. Since sheep and goats will readily become infested from contact with lousy animals of the same species and may become lousy from infested premises, it is advisable to dip all newly acquired sheep and goats before adding them to a clean flock. Sheep and goats which are lousy at shearing time or which are shorn in community or public shearing places should be dipped before the advent of cold weather to insure against the losses caused by gross infestation at a time when dipping can not be done. Freshly dipped sheep will not become infested from infested premises, and flocks may safely be held in such places between dippings.

During warm weather, corrals and other small inclosures which have recently been occupied by infested flocks should not be used for confining clean sheep or goats until such places have been cleaned and disinfected. In cleaning infested premises, remove to a safe place or burn all litter and manure; then spray all exposed surfaces with a solution of coal-tar creosote dip mixed to double the strength recommended for use in dipping.

### Detecting Lice

Lice obtain their food from the tissues of the animal on which they live. Sucking lice pierce the skin and suck blood. They do not

remain attached in one place like ticks, but they detach and make a new puncture or wound at each feeding. Since they feed at frequent intervals they cause a constant and extreme itching and irritation on the skin of grossly infested animals.

The biting lice do not cause so much annoyance and injury to the animal as the sucking species, and they are more easily eradicated. They apparently feed on particles of hair scales of the outer layer of the skin and other extraneous matter but they often group in colonies on the skin of the host and cause intense irritation and itching.

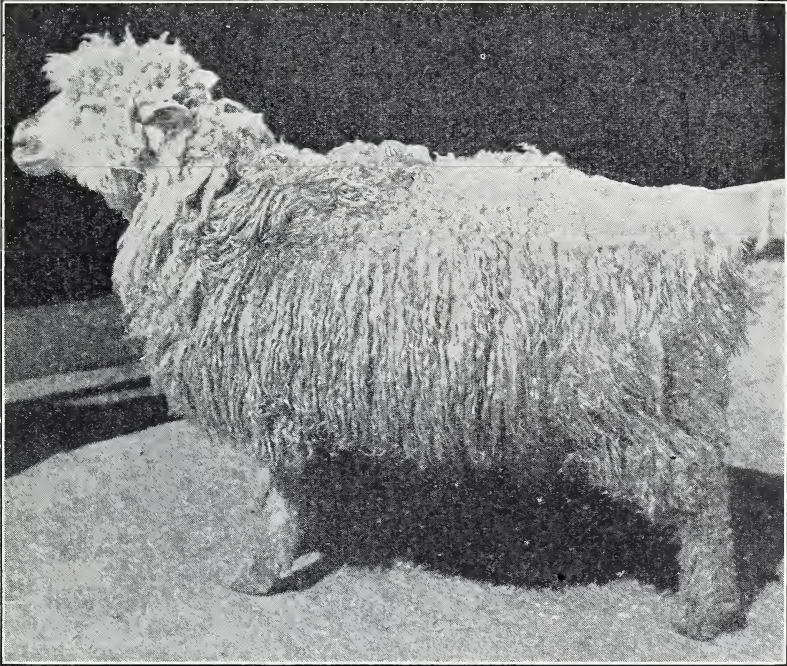


FIG. 3.—Lousy sheep, showing broken fleece

Grossly infested sheep and goats scratch and bite themselves and rub against any available object, including other members of the flock. Some of the wool fibers are broken by rubbing and biting, tufts of wool are pulled out, and the fleece becomes ragged or broken. (Fig. 3.) Biting lice may cause direct injury to mohair. The infected animals are restless and do not eat well; consequently they lose weight, become unthrifty, and show signs of low vitality. The loss in weight and in wool or mohair is so large that grossly infested flocks often are unprofitable.

Lice are more prevalent on open-fleeced or loose-wool sheep than on the fine-wool breeds, and goats are usually more liable to be lousy than sheep. Young lambs and kids and the old, weak, unthrifty members of the flock are usually the most lousy and the lambs and kids often are stunted by lice to such an extent that they never fully recover from the setback.

All species of sheep and goat lice are visible to the naked eye, and they are easily detected on close examination. The biting lice



may be found on any part of the body. The sucking lice usually seek the parts where the fleece is light or open. *Linognathus pedalis*, known as the sheep foot louse, lives on the legs and feet of sheep and is rarely found elsewhere. The condition of the fleece and the biting, scratching, and rubbing of infested animals indicate the location of the lice.

Since there are many other conditions which cause sheep to bite, scratch, and rub themselves, the mere finding of lice is not sufficient evidence that they are the sole cause of the trouble. Lice do not cause a thickening of the skin or produce pronounced local lesions. They move about on their host so that biting and scratching is not persistently repeated in one place, as it is in cases of scab or the presence, in the skin, of foreign bodies such as sharp, pointed seeds, thorns, and spines from various plants. A full description of scabies and its diagnosis, together with plans of dipping vats, are given in United States Department of Agriculture Farmers' Bulletin 713.

### Methods of Treatment

The usual methods of treating sheep and goats for lice are dipping, spraying, and hand applications of liquids, powders, or oils. Under ordinary conditions dipping is most effective. The object of applying treatment is to kill the lice and to do so the parasiticide must come in contact with the parasites. The fleece of a sheep or goat cannot be penetrated by an ordinary spray, and consequently successful spraying of sheep and goats cannot be done unless expensive and special apparatus and equipment are available.

Hand applications are often resorted to in treating animals for lice, but ordinarily this method should not be depended upon for complete eradication. About the only remedies that can be used in hand applications on sheep and goats are the dusting powders, many of which depend for their insecticidal value upon their naphthalene and pyrethrum content. Some of the dusting powders are of value in holding the parasites in check during winter weather when it is too cold for dipping, but they cannot be depended upon to eradicate sucking lice. Biting lice can be eradicated with sodium fluoride applied in the form of a powder or dissolved in water in the proportion of about 1 ounce to 1 gallon, but it is not effective against sucking lice. Care should be taken not to apply sodium fluoride too freely around the natural body openings or where the skin is thin and hairless and not to rub it into the skin. It may be applied with a dust gun or a shaker or by hand.

Several other useful and reasonably effective dusting powders have been developed. Among them are (1) 4 or 5 percent DDT in pyrophyllite, talc, or other suitable vehicle, (2) derris or cube powder of low rotenone content, and (3) fresh pyrethrum powder combined with 3 or 4 parts of flour.

### Dipping

The best method known for eradicating sheep and goat lice is to dip the infested animals in some dipping solution that will kill the parasites. One dipping if properly done will kill the lice but will not destroy the eggs. Some of the eggs usually hatch after the first dipping and unless the newly hatched lice are destroyed by the dip left in the fleece or by a second dipping before they begin to lay eggs, the flock will become grossly infested again. Since the period of incubation and the length of time before egg laying overlap and



vary somewhat in the different species, it is impossible to calculate accurately the period which should elapse between dippings. Field experience, however, has demonstrated that two dippings 14 to 16 days apart will usually eradicate all kinds of sheep and goat lice. On the other hand, the newer dips containing DDT and rotenone afford prolonged protection against reinfestation so that a second dipping in these substances is usually unnecessary.

The results of a large number of experimental dippings conducted by the Bureau of Animal Industry in different localities show that sheep and goat lice, especially the latter, are fairly easy to eradicate. In many cases, infested experimental animals held in corrals and fed grain and hay, were free from lice after one dipping, and in some instances the biting lice disappeared from goats shortly after the animals were placed on full feed even when no treatment other than full feed was applied. Practical work in the field, however, has demonstrated that lice cannot be eradicated as easily as the experimental evidence might indicate. The physical condition of the animals, the character and quantity of feed available, climatic conditions, and other factors affect the results of treatment. A heavy rain, for example, falling on freshly dipped flocks may wash the dip from the fleeces or so greatly dilute it that what remains is not sufficient to afford protection against reinfestation or to destroy the new generation as it hatches.

The dipping fluid in the vat should be from 40 to 48 inches deep, and the quantity necessary to complete the work should be ascertained before it is prepared. Freshly shorn sheep and goats and short-wool lambs and kids carry out and retain an average of about 2 quarts of dip. At late-fall dipping an average of about 1 gallon per animal will be retained in the fleece. The quantity carried out and retained by the animals plus the quantity required to charge the vat will be a fair estimate of the total quantity of dip needed. In calculating the capacity of the vat, measure only the space to be filled with liquid. To obtain the average length of the vat, add the length at the dip line to the length of the bottom and divide by 2. Obtain the average width in the same manner and measure the depth at the center of the vat. Multiply the average length by the average width in inches and the product by the depth. Divide this by 231, and the result will be the approximate number of gallons required to charge the vat.

Since lice live in the fleece and on the surface of the skin there are no scabs or crusts to be penetrated by the dip, and lousy animals need not be held in the dip longer than is necessary to wet the fleece and exposed surfaces thoroughly. One to two minutes in the dip is usually long enough to wet the animals thoroughly, and if a swimming vat of considerable length is used the animals may safely be allowed to pass through the swim without restraint. The heads of all sheep and goats should be ducked or pushed under the surface of the liquid for an instant at least twice while they are in the vat. In dipping for lice it is not necessary to heat the dip, but the temperature should not be lower than 65° F. All animals in the flock should be dipped whether they show infestation or not.

### Dips for Lice

The three kinds of dips which have been used widely to eradicate sheep and goat lice are arsenical, coal-tar creosote, and tobacco or nicotine dips.

Dips containing DDT or rotenone have become popular, and experience with them suggests that they may supplant the use of other dips on account of their ease of preparation and use, safety, high efficacy, and residual protection against reinfestation.

**Rotenone dips.**—The dilute rotenone dip that is used for eradicating ticks or keds is generally efficacious in destroying both biting and sucking lice. However, lice are frequently so resistant to treatment that an increase in concentration of the active ingredient in the dip is advised. A satisfactory dip consists of 1 pound of either derris or cube powder, having a 5-percent rotenone content, in 100 gallons of water. Since the powder is difficult to wet, the amount required for charging the vat should first be mixed into a thin paste with water.

**DDT dips.**—All sheep and goat lice are killed by dipping infested animals in preparations containing 0.2 percent DDT. The dip may be prepared by (a) directly mixing dispersible or wettable DDT powder with water, or (b) by emulsifying a previously prepared stock solution. The stock solution is made by dissolving the required amount of DDT in a suitable solvent, such as 2 parts of benzol by weight to 1 part DDT, and then adding 3 parts of emulsifiable petroleum oil. Another equally satisfactory stock solution consists of the required amount of DDT, an equal quantity by weight of xylol, and 5 parts of saponified pine oil previously warmed to about 125° F. To either of these stock solutions should be added, with constant agitation, an equal volume of warm water (125° F.). This results in a creamy-white emulsion which may be poured into cold water in the dipping vat. When thoroughly stirred, the vat contents are ready for use.

When either of the following dips are used the infested flocks should be given two dippings with an interval of from 14 to 16 days between dippings.

**Coal-tar creosote dips.**—These are sold under various trade names and when diluted with soft water they are efficacious in eradicating sheep and goat lice. When they are used in hard water a separation of the ingredients often occurs, and the first lot of animals to pass through the dip receive an undue quantity of the creosote oil, which may result in losses from injury or death. When properly used, however, in reasonably good water the coal-tar creosote dips are fairly safe and dependable remedies for lice. The instructions on the label of the containers should be closely followed. These dips may be used warm or cold.

**Tobacco or nicotine dips.**—The nicotine dips sold under many different trade names are fairly efficacious in eradicating lice when they are diluted with reasonably good water so that the solution contains from 0.05 to 0.07 percent nicotine. If used much stronger than 0.07 percent they are liable to injure the animals. The printed instructions on the label of the container should be closely followed, and unless the strength or percentage of nicotine is specifically stated on the label the preparation should not be used. Nicotine dips may be used either warm or cold, but they should not be heated above 110° F.





